Currant, Gooseberry and Elderberry

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Scientific Name and Introduction: Currants and gooseberries are closely related, berry-bearing deciduous shrubs in the *Ribes* L. genus of the Saxifragaceae family. Gooseberries are sometimes placed in a separate genus, *Grossularia* Mill.

The most common species are *R. sativum* Syme (red, white and pink currants), and *R. nigrum* L. (black currant) (Harmat et al., 1990). White currant, an albino form of red currant, is of lower acidity, thus suitable for eating fresh (http://www.crfg.org/pubs/ff/currants.html). Pink currants have a colorless skin and a pink flesh. Black currant fruit differ from red currant in being more astringent but having a distinct aroma, making it very desirable in processed products. Gooseberry cultivars are derived from *R. uva-crispa* L. (European gooseberry) and *R. hirtellum* Michx. (American gooseberry) (http://www.crfg.org/pubs/ff/gooseberry.html). The European gooseberry is much larger than the American gooseberry. European cultivars are from *R. uva-crispa* but American cultivars are virtually all from crosses of *R. uva-crispa* and *R. hirtellum*. A gooseberry fruit may be green, white (gray-green), yellow, or shades of red from pink to purple to almost black. Skin color is most intense on fruit in full sunlight. The four countries producing both the most currants and gooseberries are Germany, Czech Republic, Poland and the Russian Federation (http://apps.fao.org/lim500/agri_db.pl). North American production of currant and gooseberry has been hampered by adaptation and disease problems (Harmat et al., 1990). Currant and gooseberry are available fresh from mid-May to August or longer, if stored properly. Virtually all commercial production is put into processed products with only a small proportion consumed fresh.

In addition, brownish-purple fruit from a native western U.S. species, *R. aureum* Pursh (Buffalo currant, Albol currant, Golden currant), or from a hybrid of *R. nigrum* and *R. hirtellum* (Jostaberry), may be available in some local markets (http://www.crfg.org/pubs/ff/currants.html; http://www.agric.gov.ab.ca/agdex/200/3602001.html).

Sambucus canadensis L., elderberry, is a moderately tall deciduous shrub in the Caprifoliaceae family that is native to North America. The ease in harvesting the purplish-black fruit from wild plants may account, in part, for the lack of commercial plantings. Most of the fruit is processed since the uncooked berries are astringent and not very edible (Way, 1981). Selection and breeding, primarily in New York and Nova Scotia, has resulted in a number of cultivars (Craig, 1978; Stang, 1990; Way, 1981) and small-scale production has been reported in New York, Ohio and Oregon (Way, 1981).

Quality Characteristics and Criteria: Currant and elderberry fruit are produced on the plant in clusters, and gooseberry fruit are borne singly or in pairs. Ideally, fruit throughout each cluster should be firm, bright, with the proper cultivar-specific color, and free of decay or mechanical or insect injury. For the fresh market, it is also important to have large and uniform fruit throughout the cluster. A long shelf-life with retention of both firmness and flavor is also desirable for the fresh fruit market.

Horticultural Maturity Indices: Currants and gooseberries are harvested from mid-May through August. Red currants are usually harvested before the color changes from a bright red to a dull red color (Audette and Lareau, 1996; Spayd et al., 1990) Soluble solids are usually about 9.5 to 14% and acidity is around 2%. Generally, entire clusters of red currant are harvested as modern cultivars have uniform ripening of all berries on a cluster. Black currants, which at maturity have an opaque, very dark blue color with a soluble solids content of 15 to 26%, do not mature evenly in the cluster; the larger ones at the base of each cluster mature first (Audette and Lareau, 1996; http://www.crfg.org/pubs/ff/currants.html).

The entire cluster can be harvested or only mature berries can be picked over several harvests. At maturity, gooseberry cultivars may be green, white, yellow or various shades of red (pink to purple to almost black). Since both immature (green) and ripe gooseberries are used, harvest maturity depends entirely on end use (Ryall and Pentzer, 1982). Green gooseberries are very firm and tart, whereas some cultivars, when fully mature and soft, are quite sweet. Elderberries are harvested in late August and September when the fruit are sufficiently large and the fruit has changed to an acceptable purplish-black color. The fruit do not mature at the same time, so several pickings are necessary over a 1 to 2 week period (Craig, 1978; Way, 1981). Harvesting occurs in late August and September, depending on climate and cultivar. Postharvest decay of currant, gooseberry and elderberry can be minimized by avoiding picking wet or over-ripe fruit.

Grades, Sizes and Packaging: There are no U.S. fresh fruit standards for these fruits. There is a U.S. grade standard for processing currants, based on color, attachment of stem and freedom from decay or insect or mechanical damage. Processors, who use most of the commercial production, may have their own standards. Since fresh market volumes are not large, container sizes and packaging for the fresh market tend to be those used for similar, but more common, berries, eg., raspberries.

Pre-cooling Conditions: Currant, gooseberry and elderberry fruit are relatively perishable fruit. Quick cooling after harvest to recommended storage temperature is desirable, using forced-air cooling with a RH of 95% (Batzer and Helm, 1999; Kasmire and Thompson, 1992).

Optimum Storage Conditions: Since currant, gooseberry and elderberry are not chilling sensitive (see below), the recommended storage temperature and RH for all three is - 0.5 to 0 °C (31.1 to 32 °F) with high RH of 95% (Hardenburg et al., 1986; Story and Simons, 1989). Batzer and Helm (1999) recommended slightly warmer temperatures of 0 to 1 °C (32 to 34 °C) for red currant and gooseberry and 0 to 2 °C (32 to 36 °F) for black currant, perhaps to avoid accidental freezing. With proper cooling, the storage duration can be 1.5 , 2.5, and 3 weeks for black currant, red currant and gooseberry, respectively (Batzer and Helm, 1999).

Controlled Atmosphere (CA) Considerations: As summarized by Batzer and Helm (1999) and Thompson (1998), research indicates red currant and gooseberry respond very well to CA, whereas black currant benefits only slightly. Storage duration of red currant can be extended to 8 to 14 weeks, depending on cultivar, using 1 °C (33.8 °F), 18 to 20% CO_2 + 2% O_2. For gooseberry, storage duration is extended to 6 to 8 weeks, using 1 °C, 10 to 15% CO_2 + 1.5% O_2. Increasing the CO_2 up to 20% reduces incidence of storage rots (Batzer and Helm, 1999; Thompson, 1998), and lowering the O_2 reduces respiration rate (Robinson et al., 1975). Compared with red currant and gooseberry, black currant does not respond as well to low O_2 and its storage can only be extended to 3 weeks, using 0 to 2 °C (32 to 35.6 °F) and 15 to 20% CO_2.

There is no known information on the effect of CA on elderberry.

Retail Outlet Display Considerations: Currant, gooseberry, and elderberry should be kept in a refrigerated display but not sprinkled with water or top-iced.

Chilling Sensitivity: Currant, gooseberry and elderberry are not chilling sensitive (Kader, 1992).

Ethylene Production and Sensitivity: No data available.

Respiration Rates:

Temperature	Gooseberry	Black currant
	(mg CO_2 kg^{-1} h^{-1})	

0 °C	6 to 8	16
4 to 5 °C	8 to 16	28
10°C	12 to 34	42
15 to 16°C	30 to 74	96
20 to 21°C	46 to 116	142

To get mL kg^{-1} h^{-1}, divide the mg kg^{-1} h^{-1} rate by 2.0 at 0 °C (32 °F), 1.9 at 10 °C (50 °F), and 1.8 at 20 °C (68 °F). To calculate heat production, multiply mg kg^{-1} h^{-1} by 220 to get BTU per ton per day or by 61 to get kcal per metric ton per day. Gooseberry data are from Hardenburg et al., 1986; Robinson et al., 1975; and Smith, 1967. Black currant data are from Robinson et al., 1975.

Physiological Disorders: CO_2 above 20% results in internal breakdown and fruit discoloration in some red currant cultivars after 13 weeks storage (Thompson, 1998). Low O_2 further increases these symptoms. Smith (1967) showed that green gooseberry fruit held at 0 °C (32 °F) in air were damaged by CO_2 if it was increased from 8 to 12%. Fruit turned yellow and had an abnormal flavor. Increasing the temperature from 0 to 5 °C (32 to 41 °F) eliminated the disorder.

Postharvest Pathology: The main postharvest disease is Gray mold rot (*Botrytis cinerea*) which can appear as small brown spots on currant and gooseberry fruit (Dennis, 1983; Harmat et al., 1990; Ryall and Pentzer, 1982). These enlarge rapidly at temperatures above 10 °C (50 °F) and gradually affect the entire berry with a soft rot. Currant and gooseberry fruit can be susceptible to American powdery mildew (*Sphaerotheca mors-uva*) (Audette and Lareau, 1996; Harmat et al., 1990). Fruit that become contaminated by soil splash after heavy rain are frequently infected by *Mucor piriformis* (Dennis, 1983). Dennis (1983) also reports a fruit disease in gooseberry caused by *Alternaria* and *Stemphyllum*. The infection is usually confined to the seeds enclosed in the pericarp. If, however, the fruit is stored for a few days at ambient temperature prior to consumption or processing, the fungus invades the pericarp tissue. Several insects can attack the fruit: Currant maggot or fruit fly (*Epochra canadensis*) (North America); Gooseberry fruitworm (*Zophodia convolutella*) (North America) and Currant moth (*Incurvaria capitella*) (Europe) (Harmat et al., 1990). In addition, slugs and snails (*Helix aspersa* and *Cepaea* spp.) will attack fruit (North America and Europe) (Harmat et al., 1990). Diseases and insects are not generally serious on elderberries (Way, 1981), perhaps due to the absence of extensive plantings. An unidentified mildew can be a problem on ripe fruit, especially if the weather is cool during ripening and there is poor air circulation around the plants (Way, 1981).

Bird feeding on ripe currant, gooseberry and elderberry fruit can be a serious pest problem (Harmat et al., 1990; Stang, 1990; Way, 1981). In addition to prompt harvesting of ripe fruit, various bird repellent measures may have to be considered.

Quarantine Issues: None

Suitability as Fresh-cut Product: No current potential

Special Considerations: *Ribes* species are hosts for the White pine blister rust, which causes few problems for currants or gooseberries but is dangerous to 5-needle pine species. Thus, commercial production of *Ribes* species, especially black currant, may be banned in some U.S. municipalities (http://www.crfg.org/pubs/ff/currants.html).

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